OIPE IAP78 OCT 07 2005 PATENT & TRADEMARK OFFICE

Docket 86533PCW
Customer No. 01333

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of

David N. Nichols, et al

IMAGE SENSOR WITH TRANSPARENT TRANSITOR GATES

Serial No. 10/629,885

Filed July 29, 2003

Group Art Unit: 2811

Examiner: Gebremariam, Samuel A.

I hereby certify that this correspondance is being deposited today with the United States Postal Service as first class mail in an envelope addressed to Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Lois A. Massar

Oct. 5, 2005
Date

Mail Stop APPEAL BRIEF-PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA. 22313-1450

Sir:

REPLACEMENT APPEAL BRIEF TRANSMITTAL

Enclosed herewith is Appellants' "Replacement" Appeal Brief for the above-identified application. This is in response to the *Notification of Non-Compliant Appeal Brief (37 CFR 41.37)*, dated September 23, 2005.

The Commissioner is hereby authorized to charge the Appeal Brief filing fee to Eastman Kodak Company Deposit Account 05-0225. *A duplicate copy of this letter is enclosed.*

Respectfully submitted,

Peyton C. Watkins/lam
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Facsimile: 585-477-4646
Enclosures

Attorney for Appellants
Registration No. 36,390

If the Examiner is unable to reach the Applicant(s) Attorney at the telephone number provided, the Examiner is requested to communicate with Eastman Kodak Company Patent Operations at (585) 477-4656.

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Sir:

REPLACEMENT APPEAL BRIEF PURSUANT TO 37 C.F.R. 41.37 and 35 U.S.C. 134

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APPELLANT'S BRIEF ON APPEAL

Appellants hereby appeal to the Board of Patent Appeals and Interferences from the Examiner's Final Rejection of claims which was contained in the Office Action mailed March 1, 2005.

A timely Notice of Appeal was filed May 26, 2005.

Real Party In Interest

As indicated above in the caption of the Brief, the Eastman Kodak Company is the real party in interest.

Related Appeals And Interferences

No appeals or interferences are known which will directly affect or be directly affected by or have bearing on the Board's decision in the pending appeal.

Status Of The Claims

In the application, claims 1-3 remain pending and are the subject of this appeal.

Appendix I provides a clean, double-spaced copy of the claims on appeal.

Status Of Amendments

The last amendment filed prior to this appeal, mailed April 7, 2005, has been entered into the record of the subject patent application.

Summary of Claimed Subject Matter

Referring to Fig. 1, charge-coupled device image sensors (10) include an array (either 1 or 2 dimensional array) of pixels (12) each of which captures incident light that is converted into charge packets (representative of the captured scene). The pixels (12) also contain elements of charge-coupled devices that transfer their respective charge packets line-by-line down the array into a horizontal shift register (14). For example, the lower most line enters the horizontal shift register (14) first and then is shifted out of the horizontal shift register (14) for processing and this is repeated until the entire array is read out. An output circuit (18) receives the charge packets from the horizontal shift

register (14) for the above-mentioned processing, primarily the conversion of the amount of charge to a voltage.

Referring to Figs. 2 and 3, the present invention uses a transparent conductor for a gate electrode (40) in the output circuit (18); more specifically the output circuit (18) uses indium tin oxide as the transparent conductor.

Grounds of Rejection to be Reviewed on Appeal

The following issues are presented for review by the Board of Patent Appeals and Interferences:

1. Whether the use of a transparent conductor, such as indium tin oxide, for a gate electrode in the output circuit of a charge-coupled device image sensor is obvious in light of prior art of record which teaches the use of a transparent conductor ***only*** in the photosensitive region.

Arguments

Obvious-To-Try

The final rejection states that Stevens teaches each element of claim 1 except that Stevens does not teach the use of a transparent conductor for a gate electrode in the output structure. The final rejection then states that "the use of transparent conductor as a gate electrode is conventional and also taught by Matsumoto in the structure [of] an image sensor." The applicants then clarified the technical misunderstanding of the teachings of Matsumoto as summarized in the rejection. More specifically, the applicant clarified that Matsumoto teaches the use of ITO ***only*** in the photo-response region (image capture region within the pixels) since its use is desirable in this region. An affidavit was provided which substantiated the technical teachings of Matsumoto.

The advisory action then states:

> *applicant does not provide any evidence as to why it is not obvious to use ITO as an output gate electrode. Furthermore, applicant's statement that regions outside the image-capturing regions are often shielded, so that any stray light does not degrade the sensor performance, does not mean these regions must be shielded. Applicant's device, as well as the structure of*

Stevens does not provide any shielded regions outside the image capturing area.

The above quoted language from the advisory action highly suggests that the standard used in the rejection is an obvious-to-try standard. Precedent clearly states that a prima facia case of obviousness is not established when "the prior art did not suggest the combination or convey to those of ordinary skill in the art a ***reasonable expectation*** of success of making it." (Emphasis added) ***In re Vaeck***, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991) The affidavit clearly illustrates that there was not a reasonable expectation of success by those skilled in that art; however, the rejection articulates that applicants must prove with "absolute certainty" that there will be no success, which is not the standard for obviousness. It is respectfully submitted that a "reasonable expectation" of no success has been proved by Applicants and that the rejection is therefore not appropriate.

> *An obvious-to-try situation exists when a general disclosure may pique the scientist's curiosity, such that further investigation might be done as a result of the disclosure, but the disclosure in itself does not contain a sufficient teaching of how to obtain the desired result, or that the claimed result would be obtained if certain directions were pursued.* ***In re Eli Lilly & Co.****, 902 F.2d. 943, 14 USPQ2d 1741 (Fed. Cir. 1990)*

The simple teaching of ITO in the image capture portion of the sensor is merely a general disclosure, but it does not disclose that the claimed results would be obtained (with certain directions for the claimed result).

Teaching Away

In addition, "a reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the paths set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." ***In re Gurley***, 27 F.3d 551, 31 USPQ2d 1130 (Fed. Cir. 1994) Again, Applicants have repeatedly stated that the reference teaches the use of a transparent material, or ITO, ***only*** in the image capture portion since this creates desirable absorption of the light, and in output circuit, the use of this material is anticipated to be undesirable because it is anticipated to create

"noise" in the output circuitry. It is respectfully submitted that this is clear teaching away from the claimed invention.

General

The advisory action stated that Applicant's device, as well as the structure of Stevens does not provide any shielded regions outside the image capturing area. This statement is true. Stevens uses a "polysilicon" gate electrode for the output amplifier, and polysilicon is less transmissive to light than ITO or similar transparent conductor. As stated earlier, allowing more light into the output amplifier was expected to create noise in the output circuitry; therefore, the claimed result was not anticipated or obvious in light of the prior art.

As for the claimed invention, it is true that there is not a light shield, but the anticipated results of a degraded image as a result of using ITO was actually not discovered during testing of the claimed invention. "Rebuttal [of a prima facia case of obviousness based on structural similarity] can consist of a comparison of test data showing: (a) that the claimed compositions possess unexpected improved properties or properties that the prior art does not have." ***In re Dillon***, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1990) (in banc)

As for Asada et al, which is discussed in the advisory action, Asada teaches the use of ITO as an input or an output electrode to an IC driver circuit in a liquid crystal display unit. Unlike this invention, the input and output electrodes taught by Asada are not used as a gate electrode of a transistor, nor are they used within an integrated circuit, but are simply electrical interconnects between the display electrodes and the integrated circuit driver. It is noted that transistors are used within the integrated circuit driver, but Asada is silent about construction of the integrated circuit drivers and materials of their gate electrodes. Therefore, Asada does not teach the use of ITO as a gate electrode of a semiconductor transistor, but simply as an electrical interconnect. ITO as a simple interconnect is unaffected by light, and no degradation is expected in this display application.

Summary

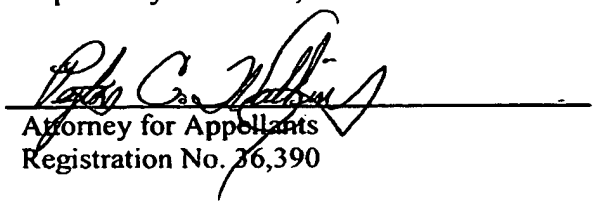
It is respectfully submitted that the Office Action has presented an obviousness rejection that relies upon inappropriate principles for obviousness. More specifically, the prior art of record "teaches away" from the claimed invention and is based upon, in Applicant's respectfully submitted position, an obvious-to-try standard for obviousness. Since this is contrary to the requirements

for maintaining a prima facia case of obviousness, the rejection of the claims set forth in the Office Action must be withdrawn.

Conclusion

For the above reasons, Appellants respectfully request that the Board of Patent Appeals and Interferences reverse the rejection by the Examiner and mandate the allowance of Claims .

Respectfully submitted,



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Appendix I - Claims on Appeal

1. An image sensor comprising:

(a) an image sensing portion for receiving incident light that is converted to a plurality of charge packets;

(b) a transfer mechanism for transferring the charge packets from the image sensing portion; and

(c) an output structure that receives the charge packets from the transfer mechanism for transporting output signals from the image sensor, wherein the output structure comprises a transparent conductor for a gate electrode.

2. The image sensor as in claim 1, wherein the transparent conductor is indium tin oxide (ITO).

3. The image sensor as in claim 1, wherein the output structure is a source follower and the transparent conductor is indium tin oxide (ITO).

Appendix II - Evidence

The Declaration under 37 CFR 1.132 submitted by David N. Nichols (the affidavit referenced in this Appeal Brief) was entered by the Examiner as evidenced in the Advisory Action dated 05/05/2005 on form PTOL-303 (page 1 of the Advisory Action). Page 2 of the Advisory Action further discloses the explanation the Examiner provided in discussing the Examiner's reasoning for stating the Declaration was insufficient. A copy of the Declaration is attached hereto.

Appendix III – Related Proceedings

There are ***no*** appeals or interferences which are known that will directly affect or be affected by or have any bearing on the Board's decision in the pending appeal.

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Appendix II

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In re Application of:

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AN IMAGE SENSOR WITH TRANSPARENT TRANSITOR GATES

Serial No. 10/629,885

Filed 29 July 2003

Group Art Unit: 2811

Examiner: Gebremariam, Samuel A.

I hereby certify that this correspondence is being deposited today with the United States Postal Service as first class mail in an envelope addressed to Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Lois A. Musser

Dec 7, 2004
Date

Commissioner for Patents
P.O. Box 1450
Alexandria, VA. 22313-1450

Sir:

DECLARATION UNDER 37 CFR 1.132

I, David N. Nichols, a co-inventor of the subject application hereby declare that:

1. I have a Ph.D. in Physics from Purdue University 1981; M.S. in Physics from Purdue University 1977; and a B.S in Physics and Mathematics from SUNY, College at Fredonia, 1975. I have been active in research & development of image sensors for 23 years. I have over 40 publications, technical reports and presentations and am the inventor or co-inventor of 4 US Patents and several applications.

2. Integrated circuit technology uses the properties of semiconductors to form transistors, resistors, and diodes for use as switches, amplifiers, capacitors, etc. These transistors and capacitors may use gate electrodes upon the semiconductor substrate to control the voltage, charge, or current within the semiconductor material. Most semiconductor circuits are not used for image sensing, but are used for a large variety of electronic systems such as computers, stereo equipment, etc. These semiconductor circuits are protected from light because light creates additional electrical charge in the semiconductor that may interfere with device operation. Therefore most integrated circuits include an

outer assembly made of opaque substances (such as black plastic materials or black ceramics) to prevent light from interacting with the circuit elements.

3. Solid-state image sensors are often based on integrated circuit technology. Solid-state image sensors take advantage of this light-induced charge generation to create an electrical signal that represents the scene focused on the sensor. These sensors are composed of light-sensitive regions in each pixel that converts light into an electrical signal, and other regions that then process that signal or are used to control the image capture. These latter regions are sometimes shielded from light to prevent degradation of the signal by additional charge generated from light.

4. To improve the photoresponse in the light-capturing regions of image sensors, transparent materials are often used. Materials such as ITO (indium-tin oxide) are used for the gate electrode within the light-sensitive regions of the pixel because less-transparent materials either reflect or absorb light, thereby preventing some of the light from reaching the semiconductor. The use of transparent electrodes in the light-capturing region of the pixel image is well known. Matsumoto et al., in US patent 4,878,120 describe the use of a transparent electrode specifically in the light-sensitive region of the pixel (column 6, lines 1-9). In the same patent, Matsumoto et al. also describe formation of source and drain electrodes of transparent material "to increase the light receiving efficiency" within the light-sensitive region of the pixel (column 11, lines 24-33). In US patent 4,589,027 by Nakamura and Matsumoto, the inventor also discloses (column 2, lines19-34) that the gate electrode for the optically active region is transparent to incident light. Later in the same specification, the inventors state (col. 3, lines 1-4) "It should be further noted that except for the light receiving gate electrode 9 the image sensor is fully covered with a light shielding film 11." Regions that are not intended for light capture often are covered to prevent light from interacting with the semiconductor.

5. Therefore, the use of a transparent gate electrode for the image-capturing region of the pixel is well known in the art of solid-state image sensors. However, in regions outside of the image-capturing region of the pixel, the use of transparent elements is not disclosed. In fact, these regions are often shielded so that any stray light does not degrade the sensor performance. Therefore, the use of a highly transparent material such as ITO for the gate electrode for the output amplifier as described in the subject application is neither conventional in the art nor is it obvious from the disclosure of the prior art.

6. All statements made herein of his own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Respectfully Submitted,

David N. Nichols

David N. Nichols